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*Public Opinion Toward on-site Generation:  
A Quantitative Approach to Simulating  
Customer Preferences*

*Eleventh National Renewable Energy Conference  
San Francisco, CA  
December 3-6 2006*

**Presented by:**  
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*Most products don't offer the best of everything.*

*EXAMPLE: Factors involved in purchasing drinks*



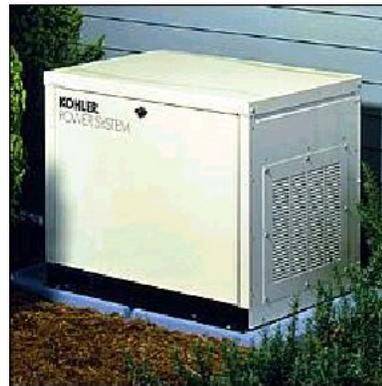
- Taste/Brand
- Cost
- Packaging
- Volume/Size
- Nutrition
- On sale?

*Trade-offs must be made.*

- o Cost
- o Maintenance
- o Warranty Term
- o Noise
- o Backup Power Capability
- o Emissions



Rooftop PV



Packaged generator



Wind turbine



Portable generator

COMPUTER  
SCREEN

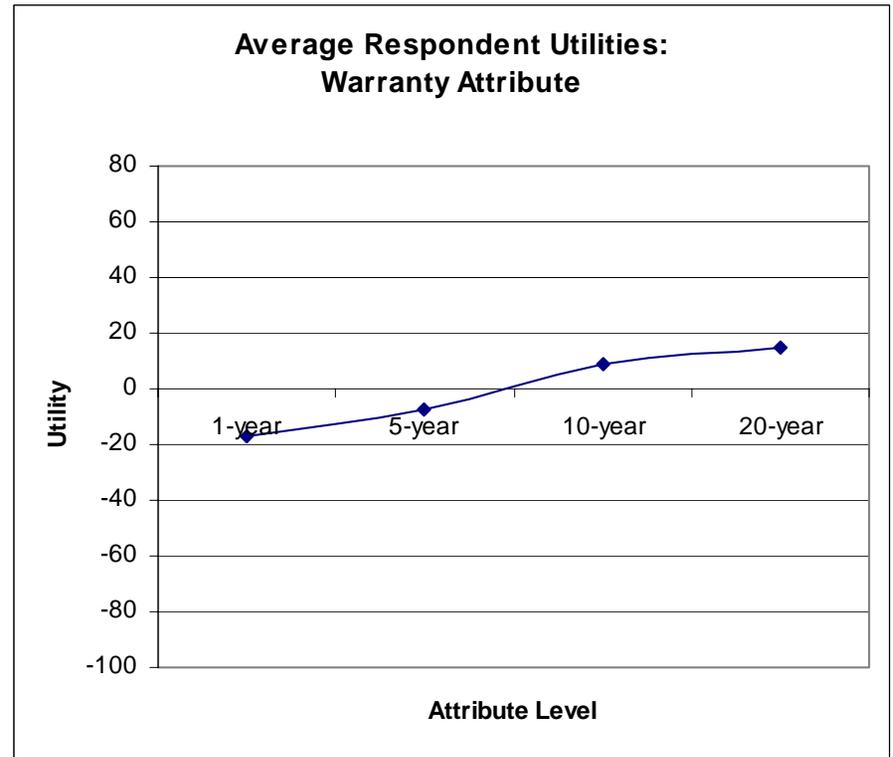
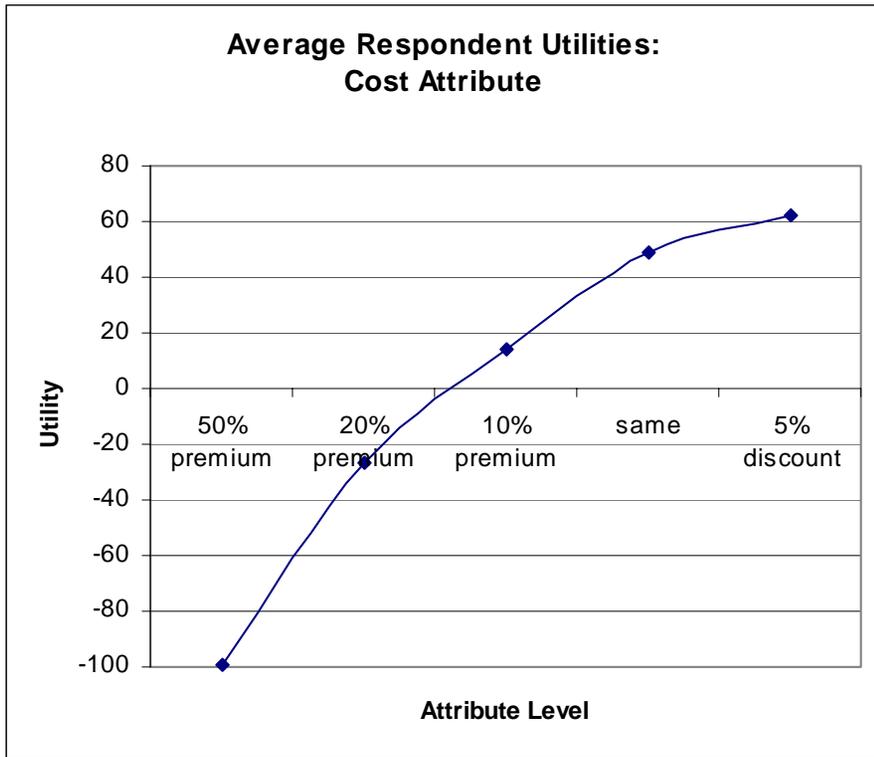
Assuming you have decided to buy an electric generator for your home, and these were your only choices, which would you choose? (select the letter).

	A	B	C	D
<i>Cost</i>	•Cost is SAME as your existing electricity service	•Costs 5% LESS than your existing electricity service	•Costs 50% MORE than your existing electricity service	•Costs 20% MORE than your existing electricity service
<i>Maintenance</i>	•Moderate maintenance	•High maintenance	•Low maintenance	•No maintenance
<i>Environmental Impact</i>	•High air emissions	•Low air emissions	•Medium air emissions	•Zero air emissions
<i>Noise</i>	•Low noise	•Silent	•High noise	•Moderate noise
<i>Warranty term</i>	•1 year warranty	•5 year warranty	•20 year warranty	•10 year warranty
<i>Back-up Power Capability</i>	•Provides power ONLY during power company outages	•Provides SOME of your daily power, INCLUDING during power outages	•Provides SOME of your daily power, but NONE during power outages	•Allows complete independence from power company

**Attribute Importance's for Total Respondent Base**

(1221 respondents representative of average U.S. consumer population over 18 years old)

<b>Item</b>	<b>Attribute Importances</b>
Cost	27.94
Back-up / Independence	24.01
Emissions	17.77
Maintenance	11.37
Noise	11.16
Standard Warranty	7.75
<i>Sum</i>	<i>100.00</i>

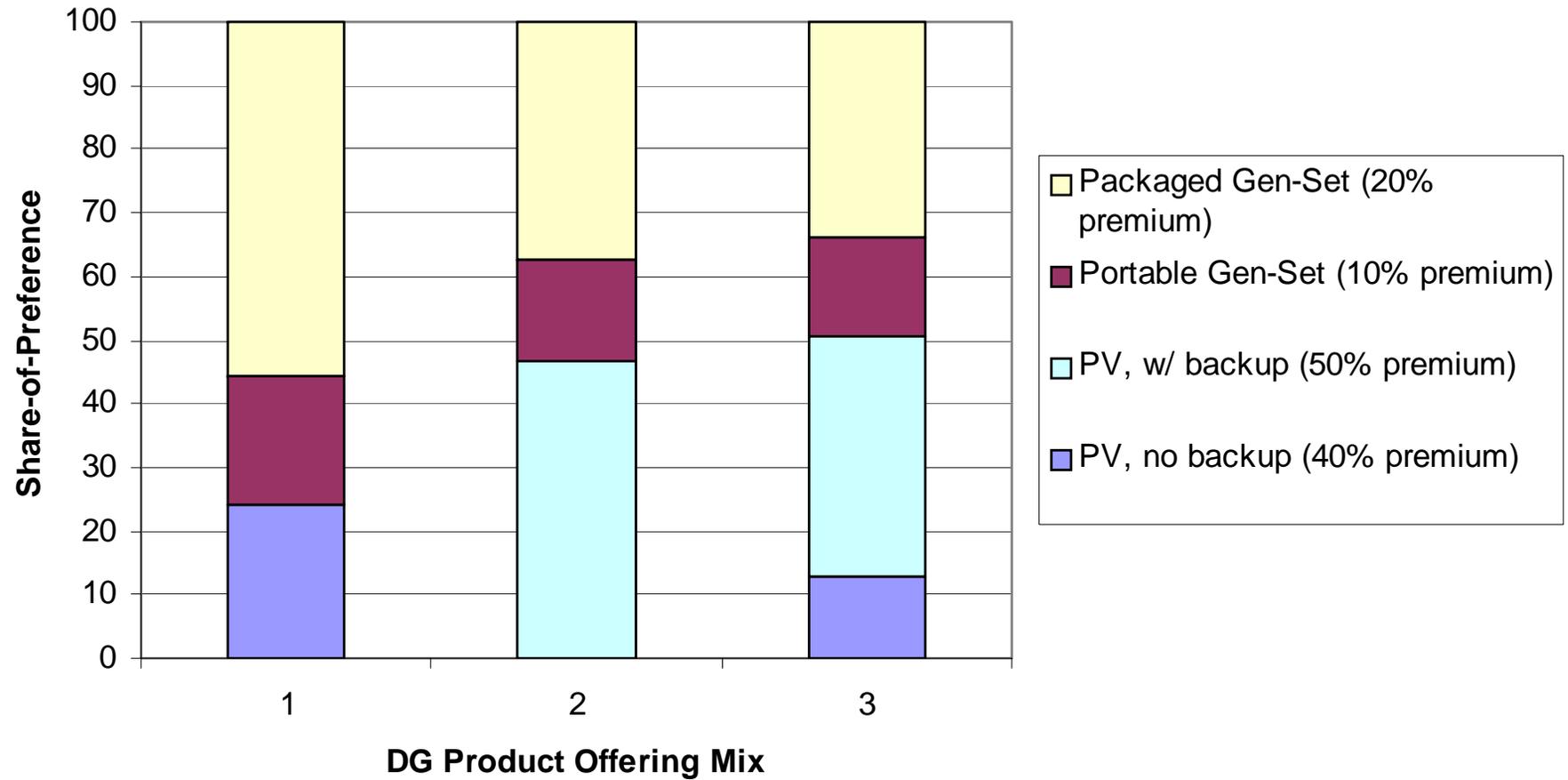




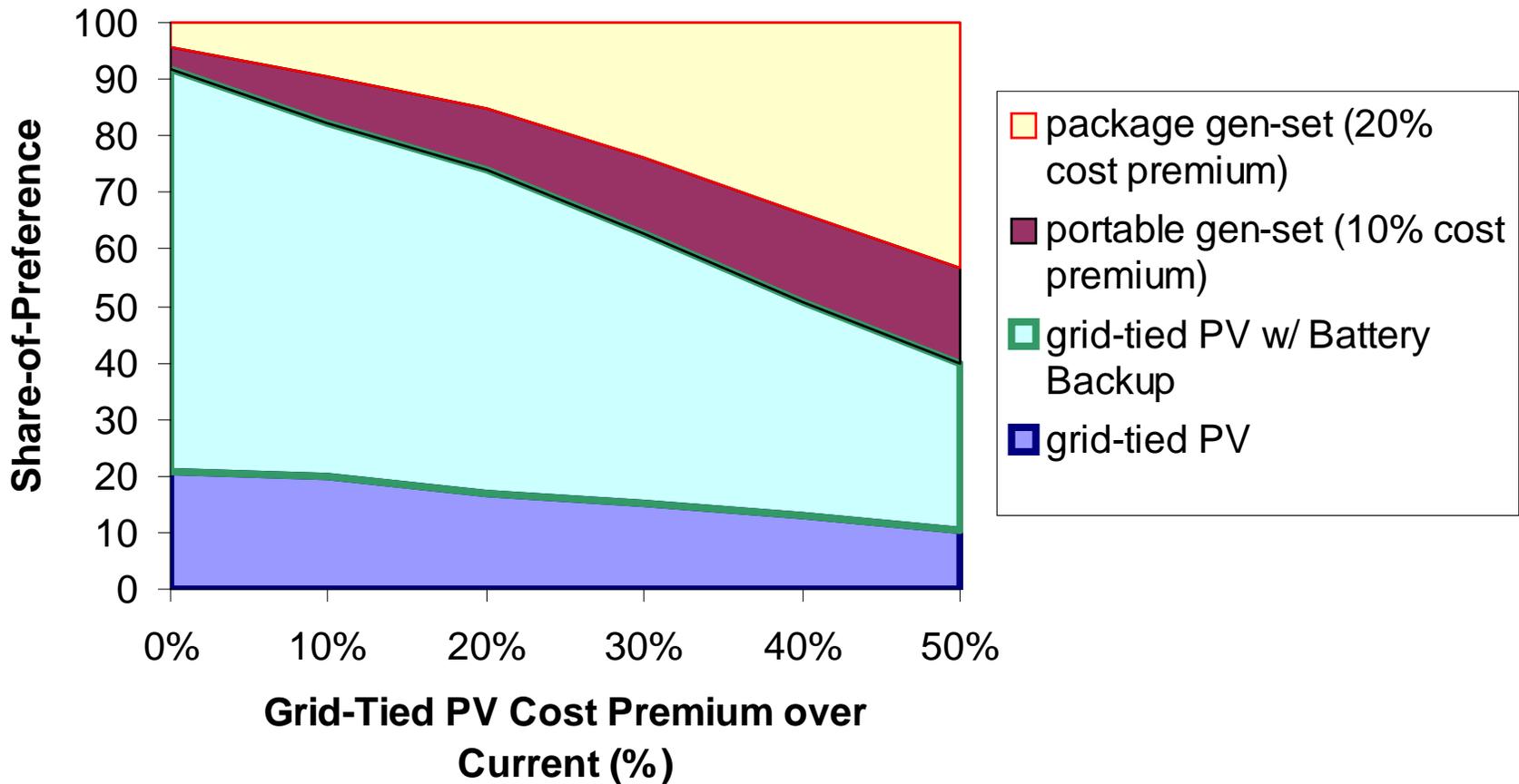
# Market Simulator Input

Attribute	Packaged Back-up Genset	Portable Back-up Genset	Grid-tied PV, WITHOUT back-up	Grid-tied PV, WITH back-up
Maintenance	Low maintenance	Low maintenance	No maintenance	No maintenance
Noise	Moderate noise	High noise	Silent when operating	Silent when operating
Cost	Costs 20% MORE than your existing electricity service	Costs 10% MORE than your existing electricity service	Costs 40% MORE than your existing electricity service	Costs 50% MORE than your existing electricity service
Std. Warranty	1 year warranty	1 year warranty	20 year warranty	20 year warranty
Air emissions	Low air pollution	High air pollution	Zero air pollution	Zero air pollution
Back-up Power / Independence	Provides power ONLY during power company outages	Provides power ONLY during power company outages	Provides SOME of your daily power, but NONE during power outages	Provides SOME of your daily power, INCLUDING during power outages

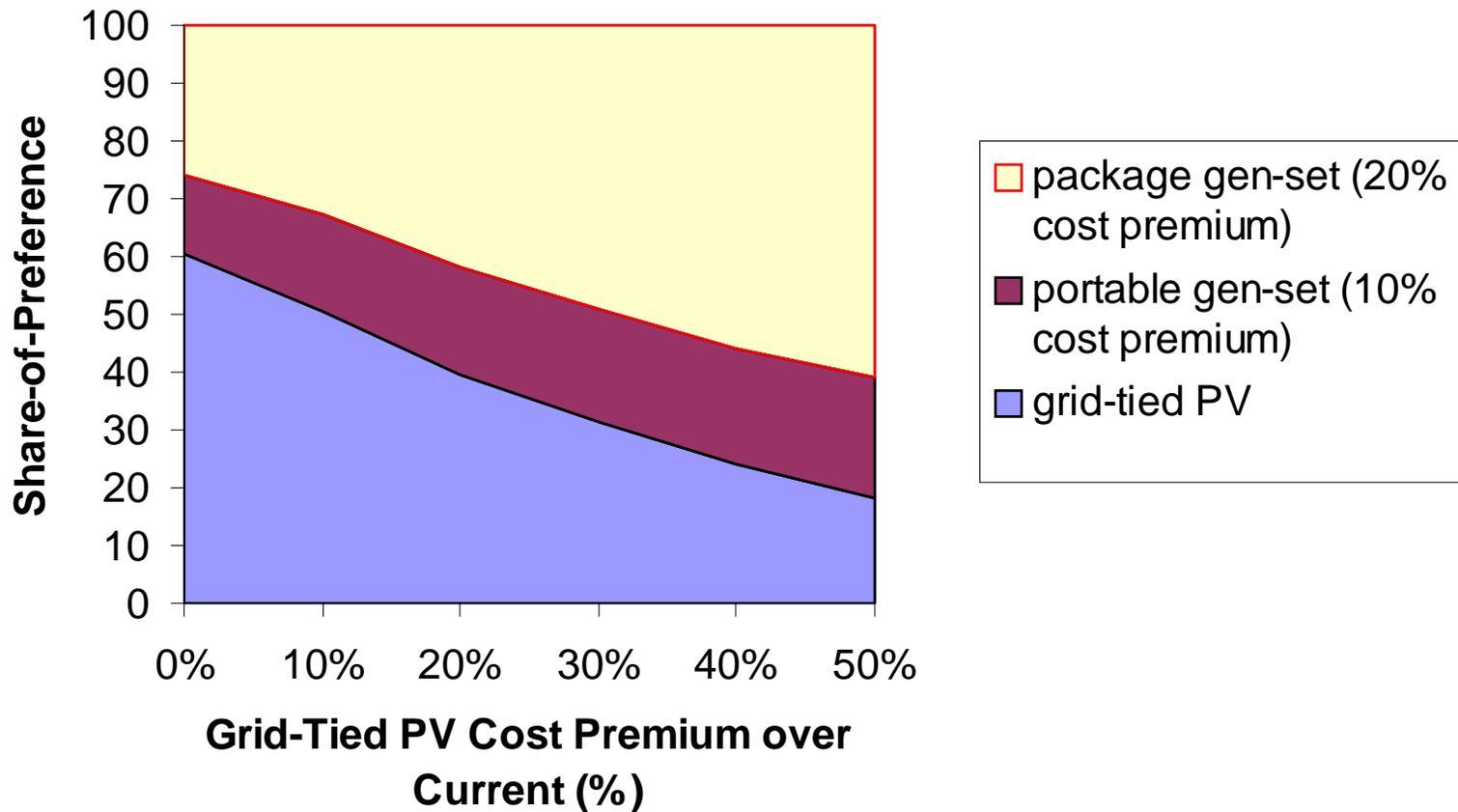
**Shares-of-Preference with Different PV Product Offerings**



**Share-of-Preference vs. Grid-tied PV Monthly Cost Premium (backup premium is 10% over current)**



### Share-of-Preference vs. Grid-tied PV Monthly Cost Premium



## *Data can be analyzed for various market segments*

- Geographic region / state
- Level of electricity service satisfaction
- Household income
- “Discretionary” income
- Education
- Age
- Gender
- Race
- Knowledge of general electricity issues
- Electric bill reviewer?
- Household decision responsibility
- Unsatisfactory number of outages?
- Recent electricity cost increases
- Rural / Urban / Suburban
- Strict homeowner standards/codes?
- Willingness to pay for DG system
- Personal priorities w.r.t. DG
  - Emissions, cost, backup, etc.
- Home office or business

- Methodology
  - Conjoint is a very useful tool for market studies
    - Allows more productive use of input from respondents
  - On-line survey technique worked *extremely* well
    - Quick, convenient, can specify audience
  
- Technical
  - Consumers have high preference for back-up capability (and are willing to pay for it)
    - Almost as important as cost
  - PV and wind system strengths are not the most “important” consumer drivers
    - however, those combined strengths are worth \$\$
  - 85% of consumers would be willing to pay a monthly premium for one of the DG systems presented
    - Weighted average was \$19/month

*Almost*  
***THE END***

The following Appendix slides are for  
information, not covered in the  
Conference presentation

- **Attribute** = product feature
  - Cost, Maintenance Required, Back-up Capability, Emissions, Noise, Warranty, (and Appearance)
- **Level** = Choices/options within features
  - Example: No, Low, Moderate, and High Maintenance
- **Utility** = value of each level of each attribute – estimated/calculated based on respondent choices
- **Importance** = measures each attribute's influence on a product's total utility/value
- **Share of Preference** = the percentage of the respondent population that would prefer one product over another in the market simulator
  - *NOT* the same as market share

- Respondent choices mimic real life purchase process
- Models the human decision-making process
  - Considered jointly
- Tool for measuring Importance and Preference for products and product attributes
- Premise: consumers evaluate the value of a product by combining the values of each attribute
- Allows market simulations (“what-if” scenarios) for different products and market segments

- **Project Goal**

- Statistically estimate which consumer drivers have the largest positive impact on deployment of grid-tied renewables

- **Why?**

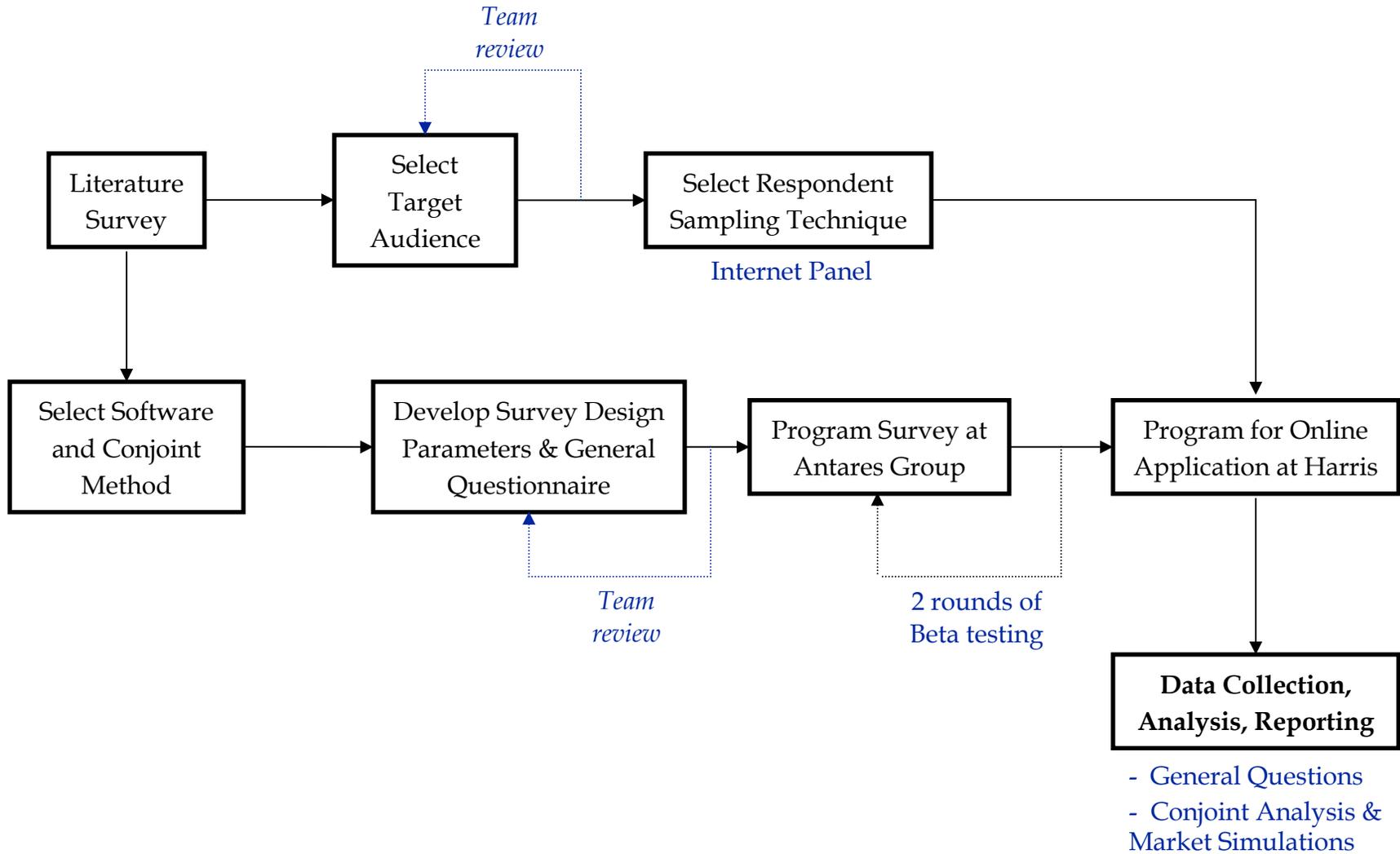
- Allow better understanding of the market for distributed renewables

- **How?**

- Conducted an on-line consumer survey
- Employed Standard and “Conjoint” survey techniques

- **Who will benefit?**

- Federal program managers and policy planners
- Private sector developers



- Relative importance of each product attribute
  - What is most important to consumers?
  - Where will research/marketing \$ be most effective?
- Impact of product changes on consumer preference
  - If I add battery backup to my packaged design, how will it impact consumer appeal?
  - If I reduce (or increase) my product costs, how will it impact consumer appeal?
- Target markets
  - Where will my marketing dollars be most effective?
- Policy impact
  - R&D appropriations, taxation incentives
- And many more . . . . .

- Largest single group and most likely near-term market for small DG systems
- Broad enough to encompass range of characteristics/viewpoints
- Heterogeneous sample reduces analytical bias
- Hard to get statistically valid sample of smaller markets (e.g. agriculture sector)
- No current publicly-available data on residential consumer preferences for DG systems for the U.S.

- Target market
  - residential population representative of U.S. population
- Sample size
  - 1,221 total (400 each from 3 regions)
- Sample location (3 regions)
  - West/lower Midwest, Northeast, remaining states
- Sampling technique
  - panel chosen from Harris Interactive's Internet consumer panel
- Survey length
  - ~ 20 min. per respondent

States with Competitive Green Power Offerings



Harris Interactive - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Refresh Home Search Favorites History Mail Print Edit Discuss Web Entry

Address [http://d.harrispollonline.com/scripts/scywebMT.dll/Job\\_w14650-231296-1376](http://d.harrispollonline.com/scripts/scywebMT.dll/Job_w14650-231296-1376) Go Links >>

**Harris Poll Online** STATUS

Attributes <small>(Version 1 Task 20)</small>	Product 1	Product 2
<b>Maintenance</b>	Low maintenance	High maintenance
<b>Noise</b>	Low noise	Moderate noise
<b>Cost</b>	Costs 50% MORE than your existing electricity service	Cost is SAME as your existing electricity service
<b>Warranty</b>	10 year warranty	20 year warranty
<b>Air Pollution</b>	Zero air pollution	Low air pollution
<b>Amount of Power</b>	Allows complete independence from power company	Provides power ONLY during power company outages

Which product, as described in the grid above, would you choose?

Product 1  
 Product 2

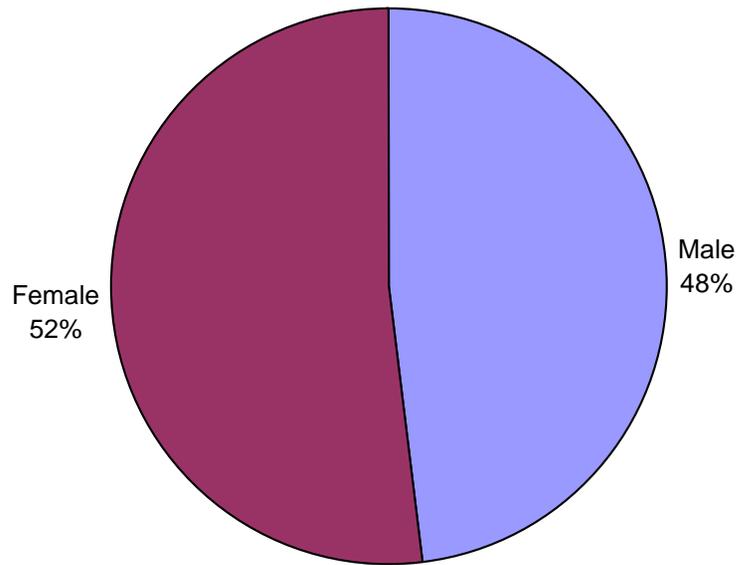
[Click here to review the glossary.](#)

FORWARD Copyright ©2001 Harris Interactive QUIT

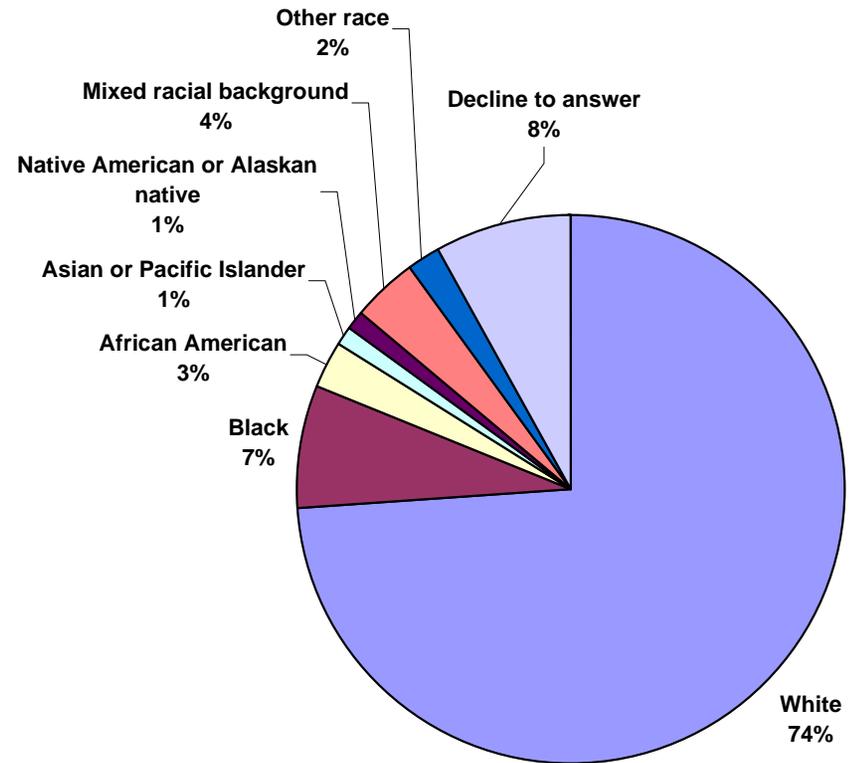
Start Internet

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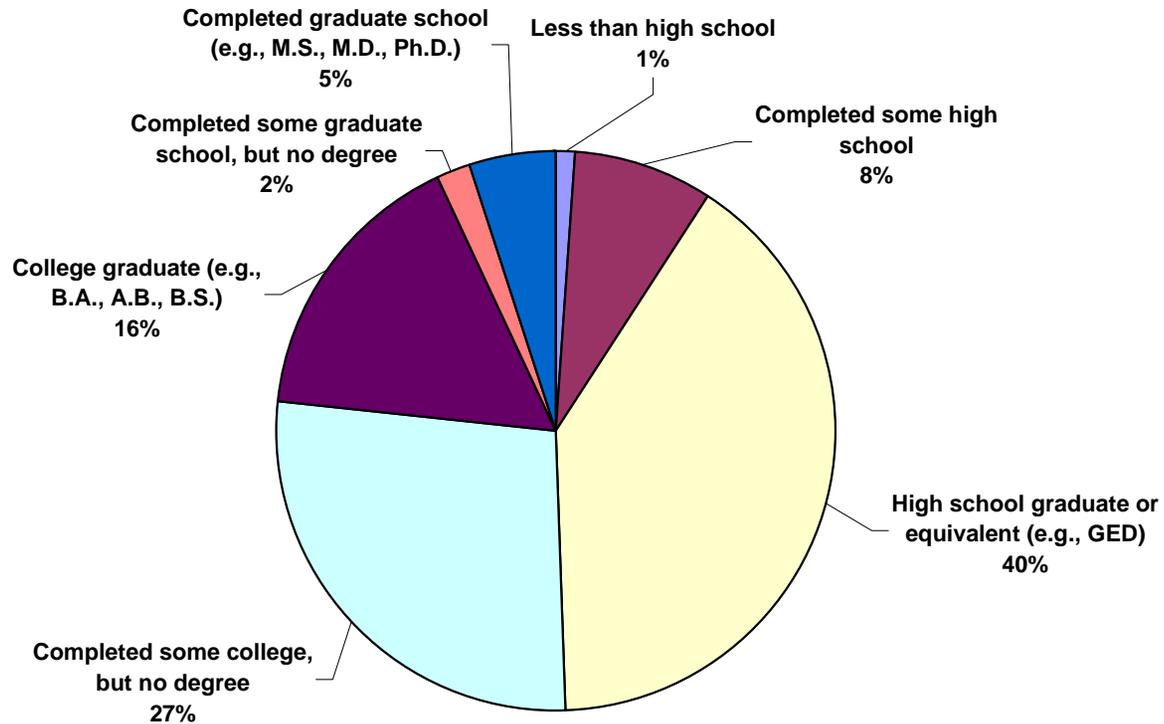
**Gender of all respondents**



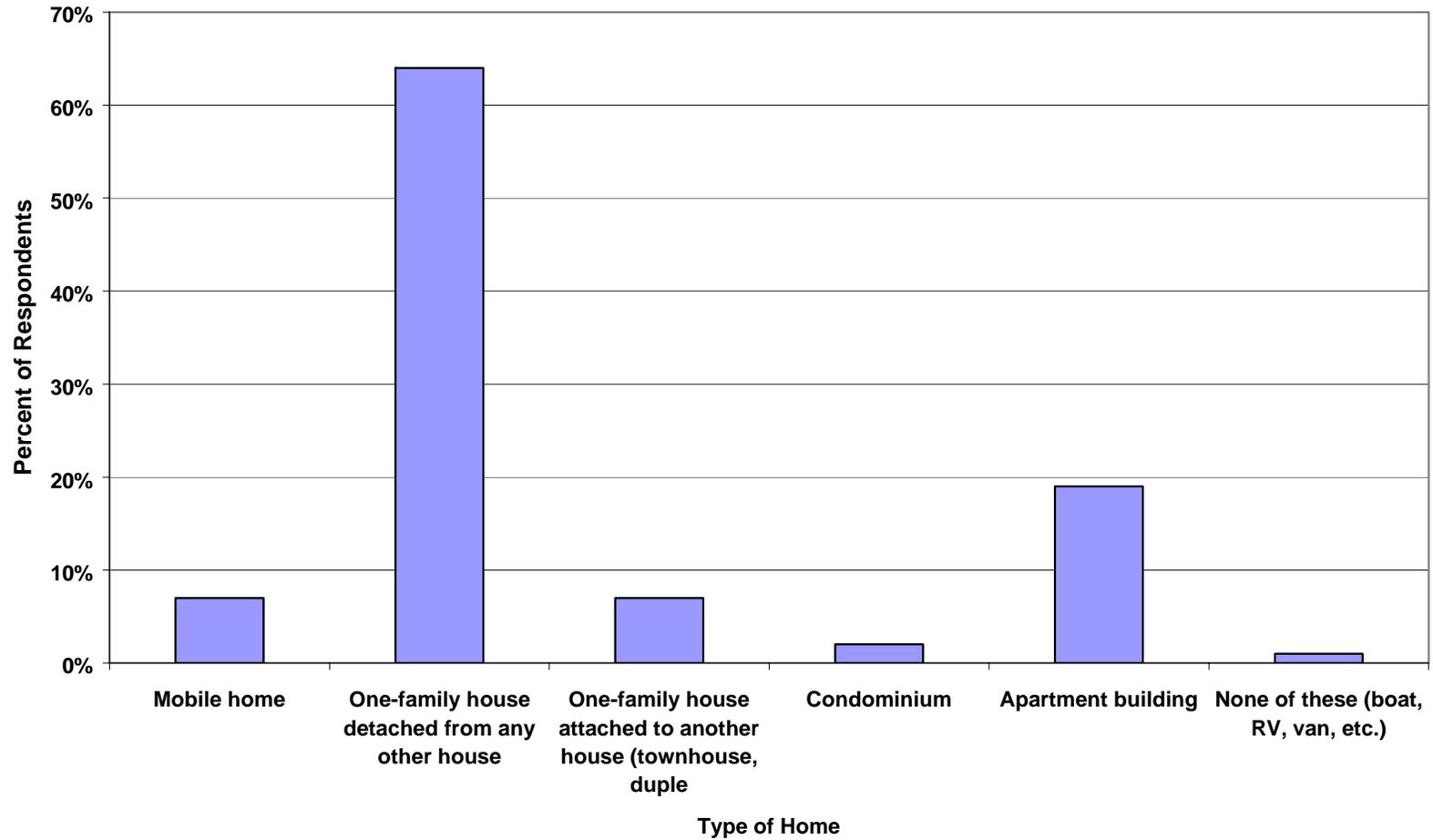
**Racial background**



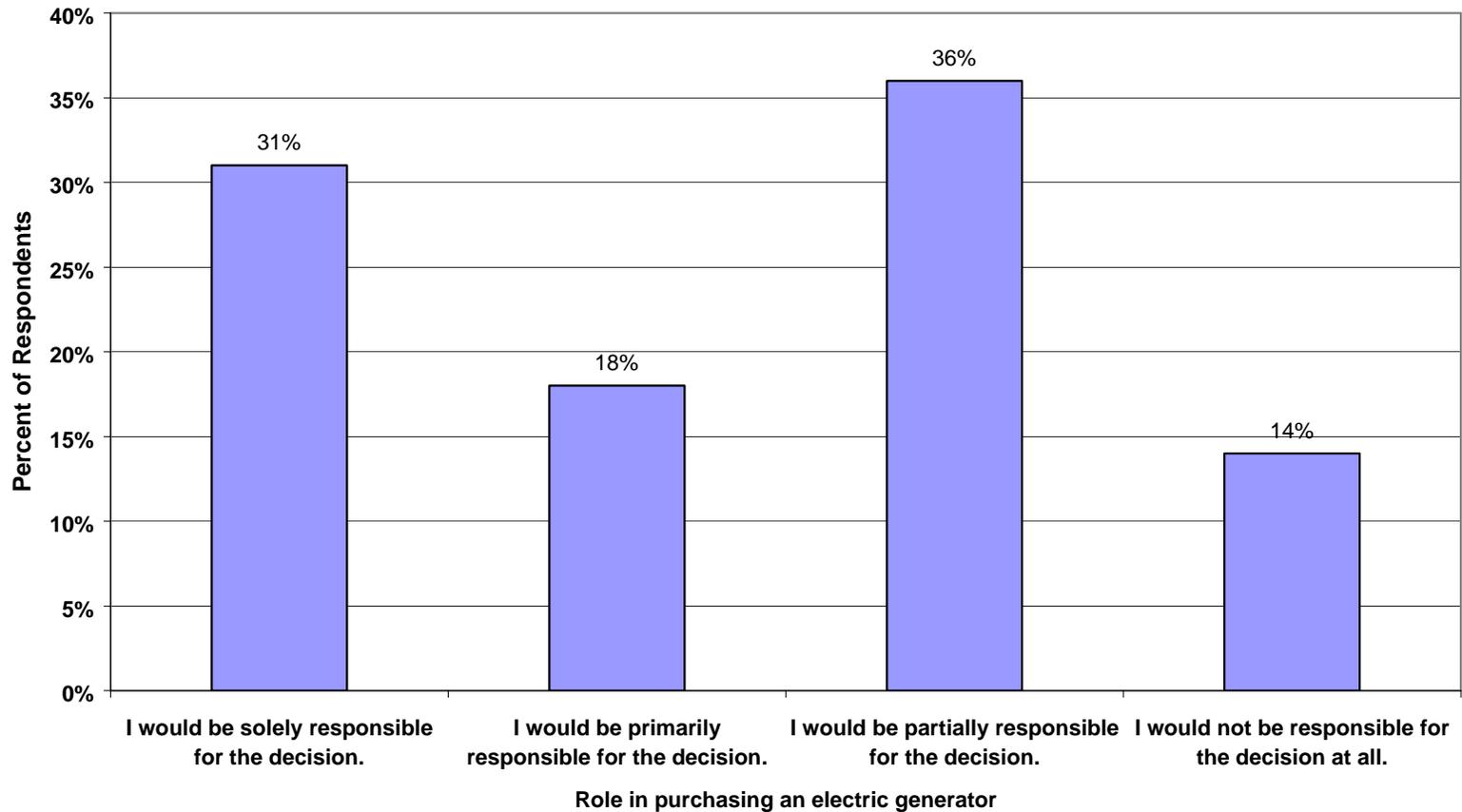
## Education



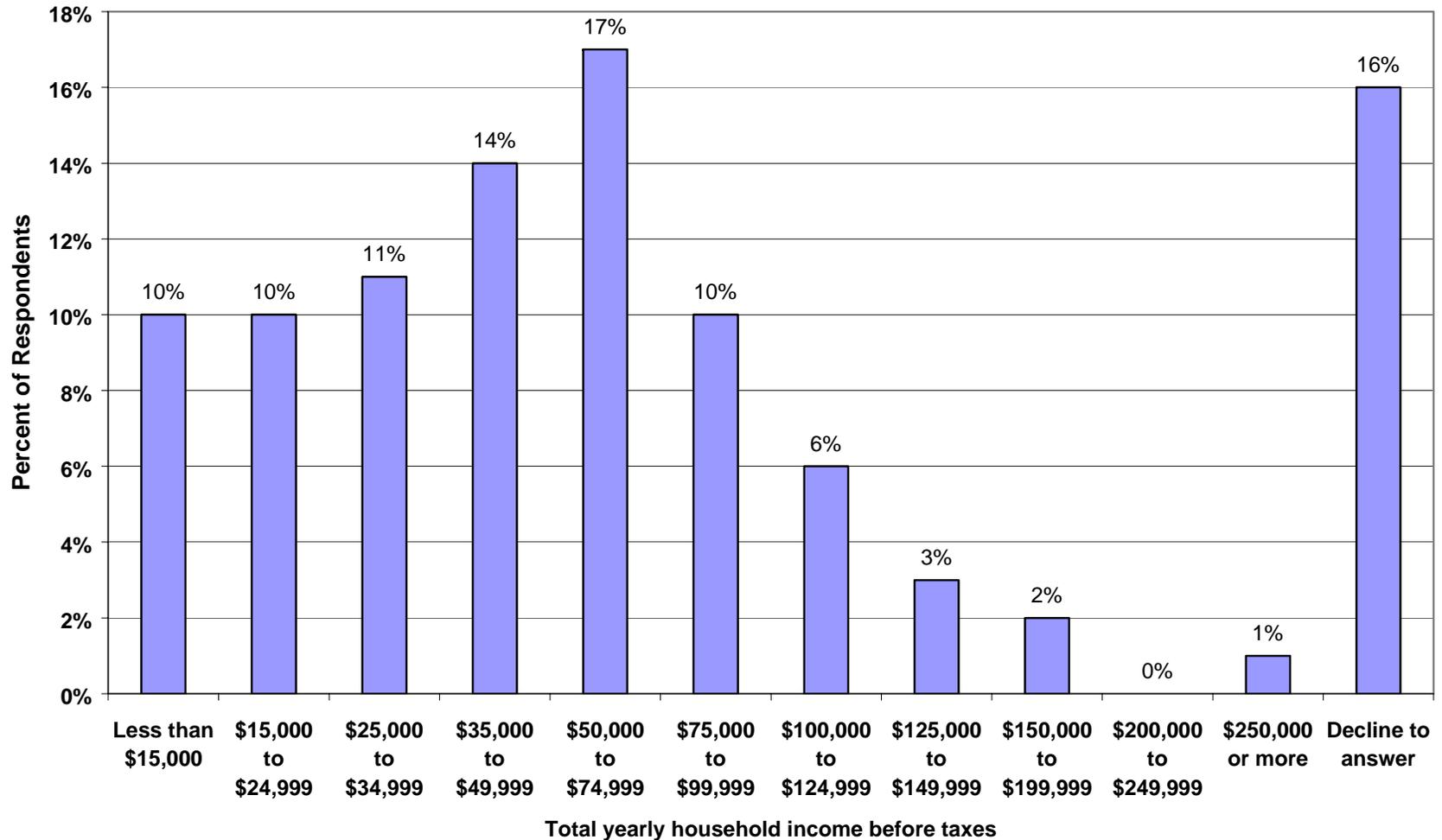
Type of home respondents live in



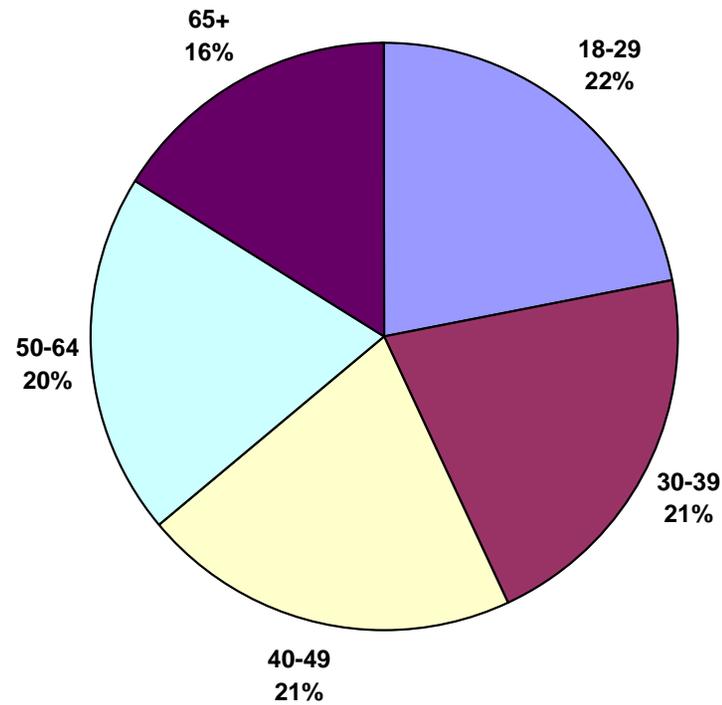
## Best description of respondents' role in purchasing an electric generator for their home



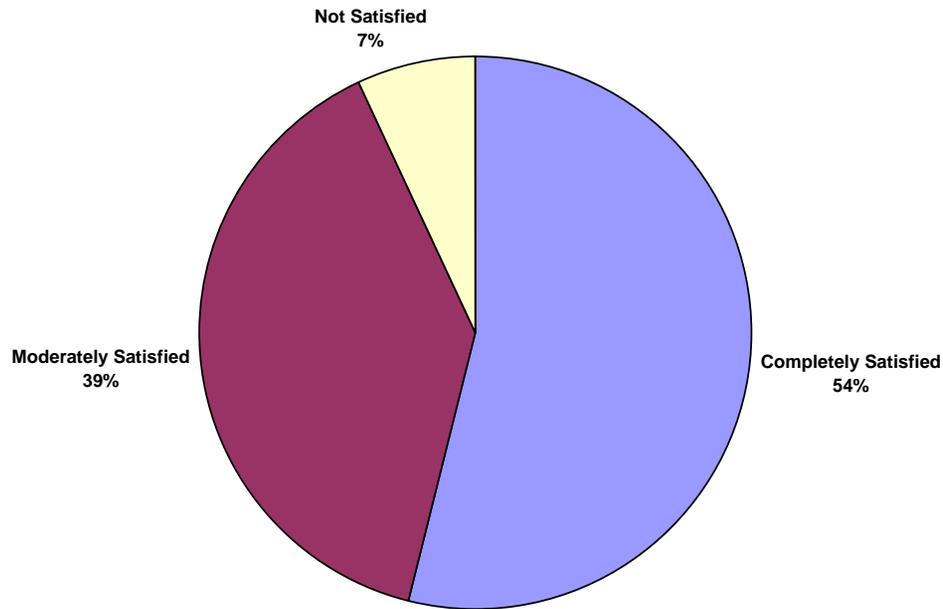
**Total year household income before taxes**



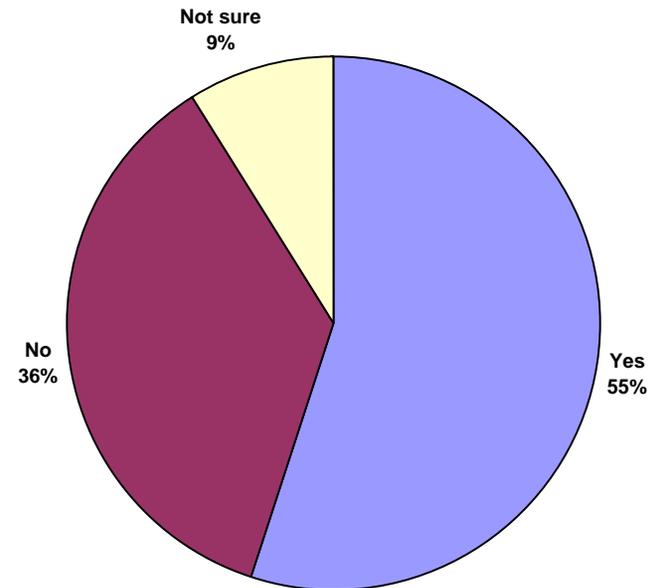
## Age of Respondents



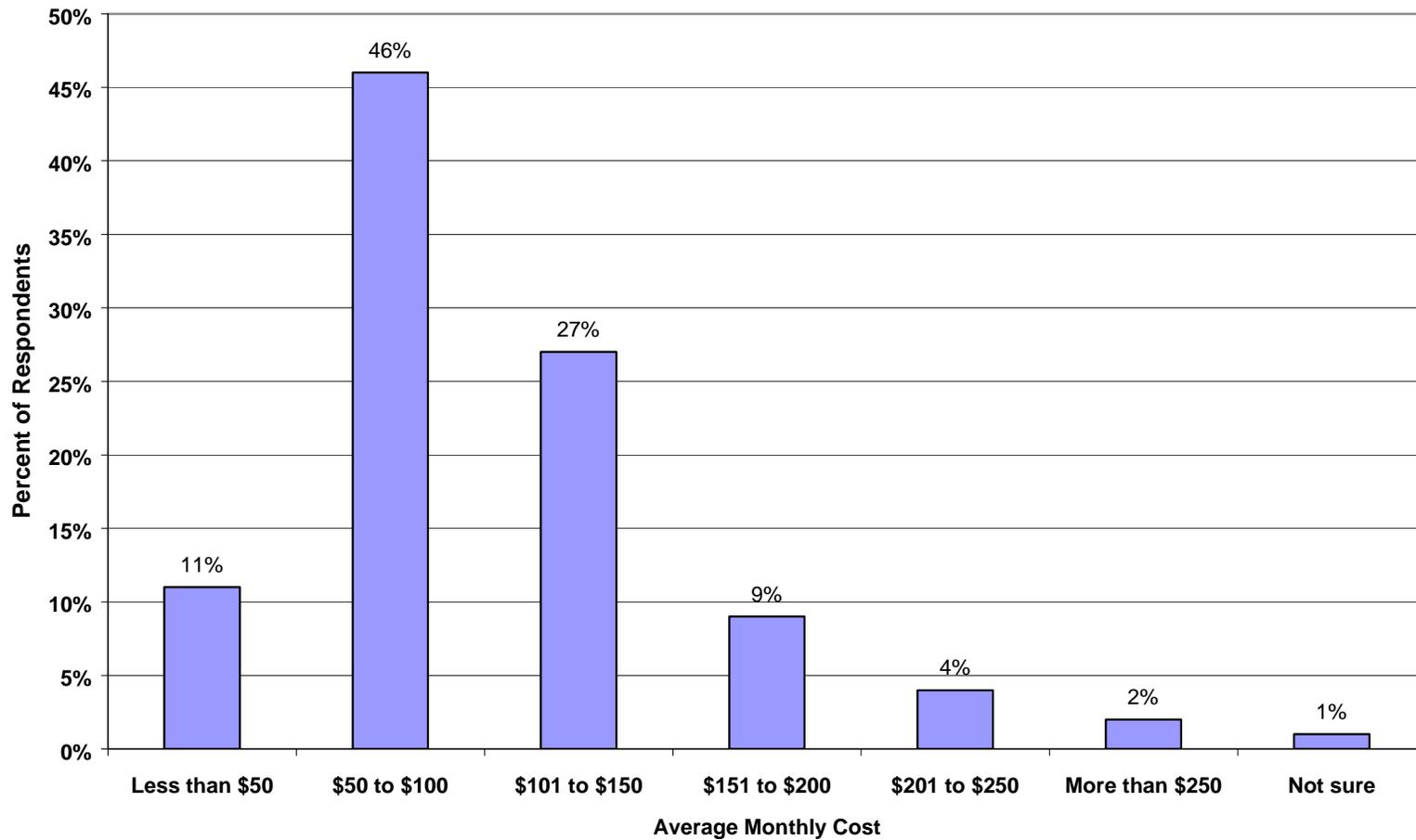
Total Percentage Satisfied With Current Electricity Service



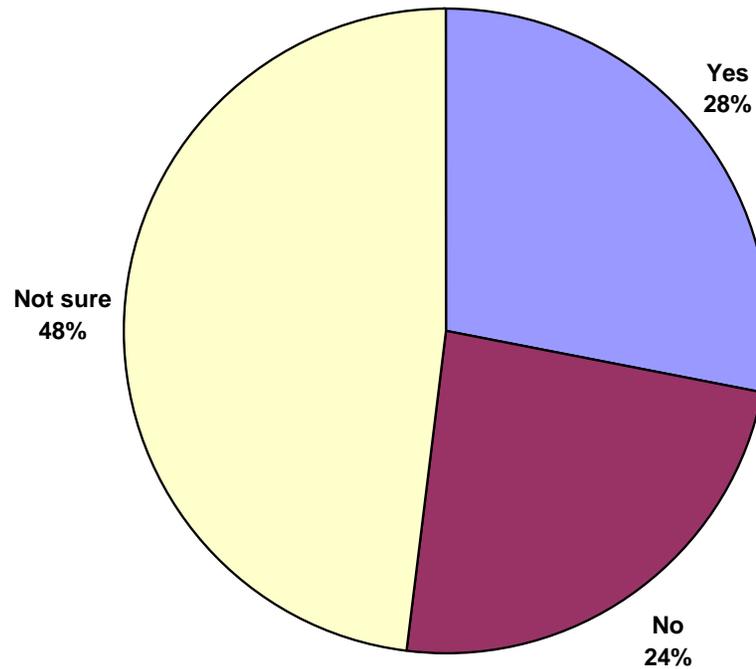
Price of electricity increased in the past two years?



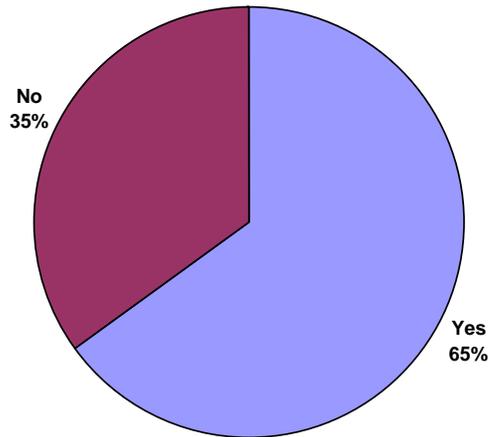
**Cost of Average Electric Bill**



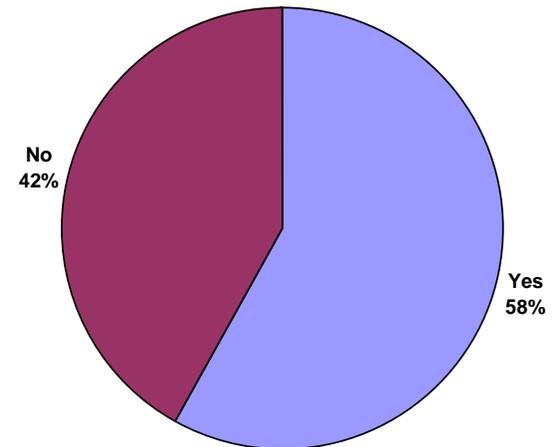
**Has Your State Deregulated its Electricity Industry?**



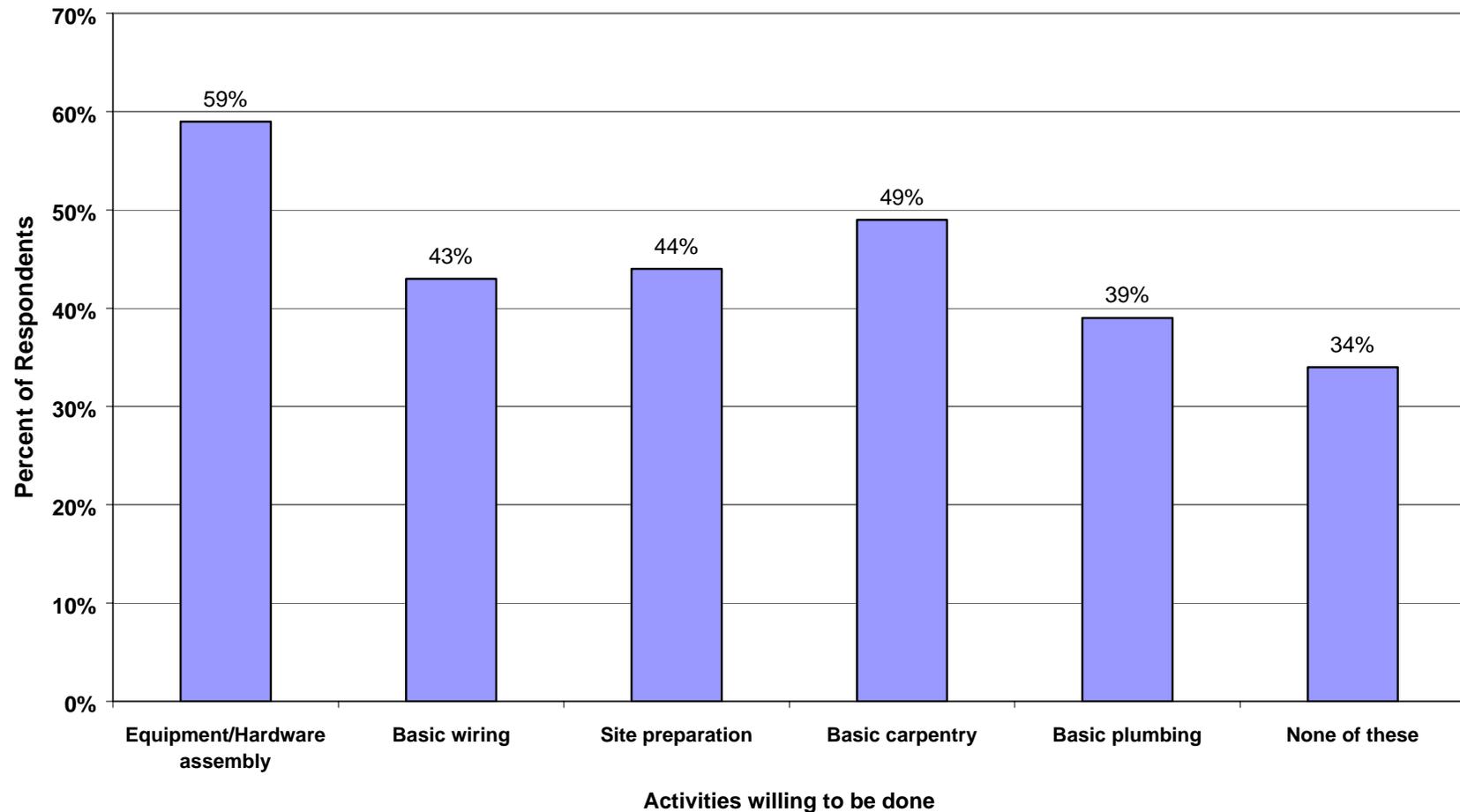
Is the number of *extended* power outages per year acceptable to you?



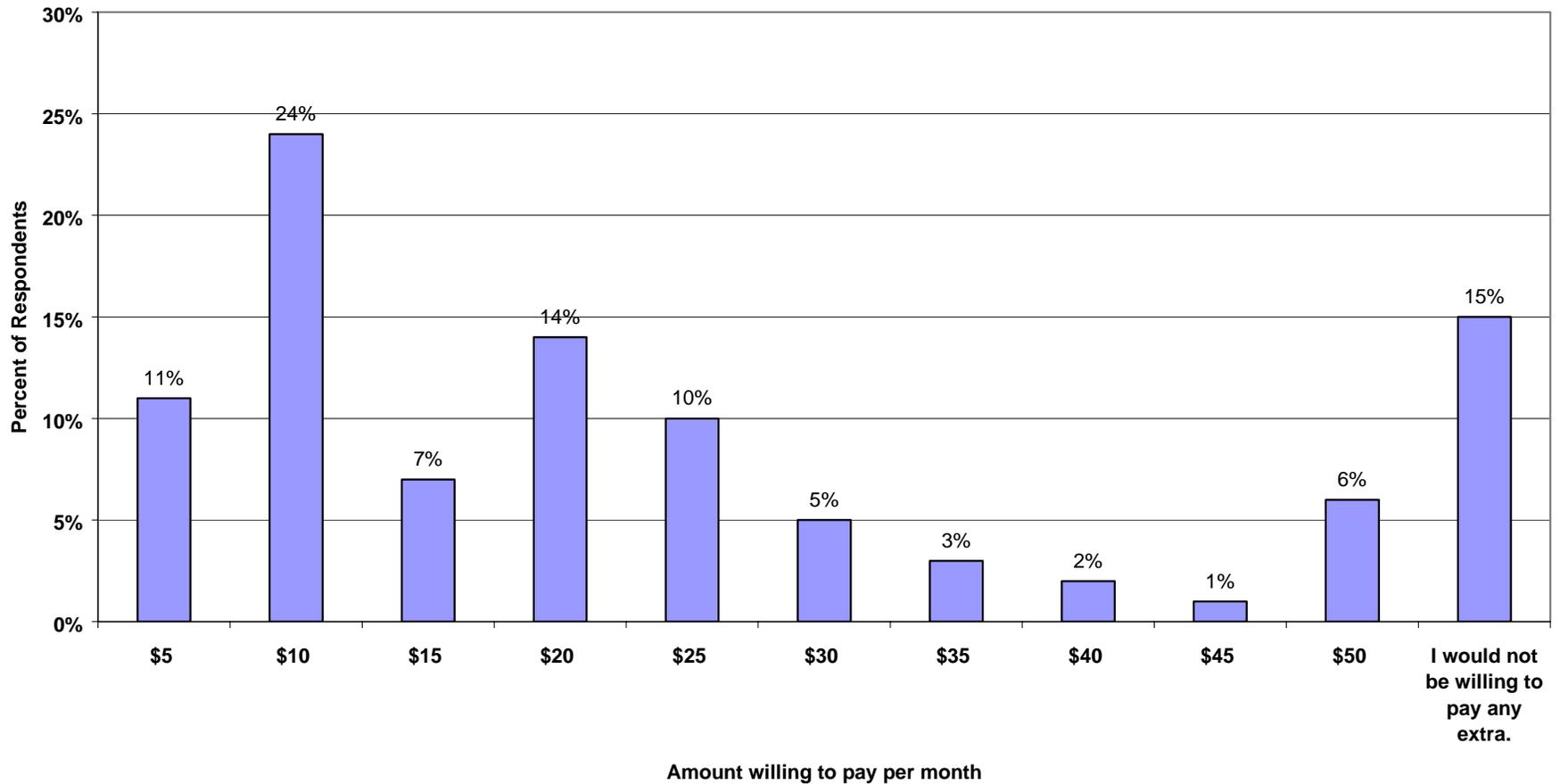
Is the number of *momentary* power interruptions per year acceptable to you?



**Which of the following installation activities would you be willing to do yourself in order to save on installation costs?**



How much (if anything) extra would you be willing to pay (per month) to own the generators presented to you in this survey?



Average premium amount = \$19/month